

11/16 Enrichment

- use systems of equations
to determine patterns

Linear	$y = mx + b \rightarrow y = ax + b$
Quadratic	$y = ax^2 + bx + c$
Cubic	$y = ax^3 + bx^2 + cx + d$

$$t_n = an^2 + bn + c$$

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ex/

5 7 9 11 13 15, ...

↓ ↓ ↓ ↓ ↓

2 2 2 2 2 linear

$t_n \rightarrow n$ th term

$t_1 = 5 \quad n=1$

$t_2 = 7 \quad n=2$

$t_3 = 9$

$t_n =$

$t_n = an + b$

$\begin{cases} 5 = a + b \\ 7 = 2a + b \end{cases}$

$2 = a \quad b = 3$

$t_n = 2n + 3$

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ex 2

11, 16, 21, 26, 31, ...
 ↓ ↓ ↓ ↓
 5 5 5 5 linear

$$t_n = a \cdot n + b$$

$$11 = a + b$$

$$16 = 2a + b$$

$$5 = a \quad b = 6$$

$$t_n = 5n + 6$$

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ex 3

-7, -6, -1, 8, 21, 38, 59, ...
 ↓ ↓ ↓ ↓ ↓ ↓
 1 5 9 13 17 21
 ↓ ↓ ↓ ↓ ↓
 quad. 4 4 4 4 4

$$t_n = an^2 + bn + c$$

$$-7 = a + b + c$$

$$-6 = 4a + 2b + c$$

$$-1 = 9a + 3b + c$$

$$1 = 3a + b$$

$$5 = 5a + b$$

$$2 = a$$

$$b = -5$$

$$c = -4$$

$$t_n = 2n^2 - 5n - 4$$

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Do

0, 13, 32, 57, 88, 125, ...

$$t_n = an^2 + bn + c$$

$$0 = a + b + c$$

$$13 = 4a + 2b + c$$

$$32 = 9a + 3b + c$$

$$t_n = 3n^2 + 4n - 7$$

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$$1. \quad t_n = an^3 + bn^2 + cn + d$$

$$4. \quad \begin{array}{r} 1 \\ + \\ 3 \\ \hline 4 \end{array}$$

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